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The National Cancer Data Base Report on Endometrial Cancer

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Background: Previous Commission on Cancer data from the National Cancer Data Base (NCDB) have examined time trends in stage of disease, treatment patterns, and survival for selected cancers. The most current (1992) data for endometrial cancer are described here.

Methods: Four calls for data have yielded a total of 560,455 cancer cases diagnosed in 1986–1987, and 599,597 cancer cases diagnosed in 1992, from hospital cancer registries across the United States.

Results: Data were received for 36,341 endometrial cancer patients. No significant change in stage distribution for patients who were staged was noted with time, however, markedly fewer patients were reported with unknown stage in 1992 (15.6%) compared with 1986–1987 (45.1%). Blacks and low income groups were more likely to present with advanced stage disease. A 12.6% increase in patients undergoing nodal dissection as part of their surgical treatment occurred during this time period. More patients received surgery only as part of their treatment in 1992 (53.8% vs. 42.6%). Advancing age, minority status, low income, and increasing grade all had a negative impact on survival. Blacks experienced a 25% reduction in survival compared to non-Hispanic Whites and Hispanics.

Conclusions: Lack of improvement in detecting early disease indicates the lack of an acceptable screening methodology for this disease. Blacks present with more advanced disease and subsequently have a decreased survival compared to non-Hispanic Whites. Time trends indicate that nodal dissection is becoming a more common surgical practice in this disease, and that radiation therapy is utilized less often. The current American Joint Committee on Cancer staging accurately reflects differences in prognosis by stage.

KEY WORDS: national survey, staging treatment, survival

INTRODUCTION

Carcinoma of the endometrium is the most common gynecologic malignancy. Approximately 31,000 cases were diagnosed in 1994 and some 5,900 women are expected to lose their lives as a result of this disease [1]. The relatively good overall survival noted with this disease is reflective of the early stage in which this disease is usually diagnosed.

A number of trends developed in the last few decades have led to what many believe is a more logical approach to the staging and management of this disease. These include the adoption by the International Federation of Obstetrics and Gynecology (FIGO) and the American

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Communication from the American College of Surgeons Commission on Cancer and the American Cancer Society.

Joint Committee on Cancer (AJCC) of a surgicopathologic system of staging for this disease and the identification of prognostic factors that can help guide postoperative adjunctive therapy [2].

Reported herein is the most recent endometrial cancer data from the National Cancer Data Base (NCDB).

MATERIALS AND METHODS

The NCDB is a joint project of the Commission on Cancer (COC) of the American College of Surgeons (ACoS) and the American Cancer Society (ACS) to facilitate comparative assessment of patient care and outcome data at the hospital, region, state, and national levels [3–5]. The NCDB provides an external benchmark which is used by participating hospitals. The NCDB and its associated special studies (patient care evaluation [PCE]) are synergistically linked with the general cancer program approval process of hospitals conducted by the COC [6]. Data have, however, been both solicited and received from hospitals with and without approval status.

Source of Case Information

Five NCDB calls for data have been issued since 1989. Mailings were routinely sent to 2,100 hospitals (1,340 ACoS approval programs, 760 other) and all known central/state registries and software vendors/suppliers.

The data received included a total of 2,606,594 cases representing all sites of disease from 1,487 hospitals for the diagnosis years, 1985–1988 and 1990–1992. Cases were collected in two year groupings, 1990 cases and 1985 cases with 5 years of follow-up, 1991 cases and 1986 cases with follow-up, and so forth. Cases from 1989 will be collected with 1994 cases in the future. The number of participating NCDB hospitals has increased markedly between 1985 and 1992. This increase parallels and reflects the increase of computerized hospital cancer registries over that time period. Most data were received from hospitals with a computerized cancer registry, possibly introducing hospital selection bias. Further, the data are thought to represent hospital-based care, and do not comprehensively include outpatient data. Also, National Cancer Institute (NCI)-designated comprehensive cancer centers were underrepresented in the data, with some of these centers having data systems and coding schemata of their own design making data sharing difficult.

Each of the nine U.S. census regions was well represented in the data, including for cases diagnosed in 1992, 70 hospitals or more and 30,000 cases or more from each region. The two regions with the highest percent of participation were the Pacific with 65% (99,658 cases) and the Mountain with 64% (31,923 cases). The region with the lowest percent of participation was the Mid-Atlantic with 40% (36,441 cases).

The age distribution of the NCDB patients was compared with a large population-based series [6]. The distributions were similar with some differences present, including fewer childhood and young adult (0–29 years) NCDB cases (2.6% vs. 3.5%), more NCDB cases aged 30–39 (4.2% vs. 3.4%), and more NCDB cases aged 70–79 (29.4% vs. 23.6%).

The sources of the case information, and its characteristics for earlier time periods have been previously described [3–5].

The endometrial cancer cases include all cancers reported for ICD-O-2 C54. Data received included 19,245 endometrial cases first accessioned in 1986–1987 and 17,096 cases in 1992. These data represent approximately 27% and 53% of all endometrial cancers in the United States in 1986–1987 and 1992, respectively.

Of the reported 1992 endometrial cancer cases, most patients (68%) were diagnosed and treated at the reporting hospitals, 28% received all or part of their treatment at the reporting hospital but were diagnosed elsewhere, and 3% were diagnosed at the reporting hospital but treated elsewhere.

Coding and Presentation of the Data

We have chosen for convenience of analysis purposes to combine the data for 1986 and 1987, including outcome, as one point in time and use cases from 1992 as another point in time.

The baseline data items of the NCDB include: 1) patient characteristics (sex, age/date of birth, race/ethnicity, zip code of residence, admission date, discharge date, class or analytic status); 2) tumor characteristics (primary site, laterality, histology, grade, regional nodes positive/examined, tumor size, general summary stage, clinical [cAJCC] stage group, pathologic [pAJCC] stage group, date/type of recurrence, sites of distant metastasis); 3) first course of treatment (surgery, radiation, chemotherapy, hormone, biological modifier, and other); and 4) follow-up (last contact date, vital status, and tumor status). They were transmitted to the NCDB following a standard data transfer specification [7].

The case data for each patient were coded in the traditional manner by trained cancer registrars in their respective hospitals before being transmitted to the NCDB [8]. Some cases were received coded for topography using ICD-O-1 [9]. These were then converted to ICD-O-2 [10,11] prior to analysis.

To better understand the data, the distribution of the baseline characteristics was analyzed and differences noted. In most cases, these variables were broken down by subpopulations including 1) seven age groups (0–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80+), 2) sex, 3) six analytic geographic regions, 4) five ethnic groups (non-Hispanic Whites, Hispanics, African-Americans, Asians, and Native-Americans, 5) three income levels (low, middle, high), 6) rural/urban, 7) reporting hospital caseload, and 8) COC approval program category for the reporting

hospital (NCI designated, teaching hospital, community-comprehensive, community, other approved, and hospitals without approval status). The NCI-designated cancer centers include both comprehensive cancer centers and clinical centers.

The nine U.S. census regions were collapsed into six geographic categories, by combining the New England and Northeast regions into one analysis region, herein referred to as Northeast, the East and West North Central regions were combined into the Midwest, and the East and West South Central regions were combined into the South.

Income was inferred for each case based on the average family income of the zip code of residence. Tertiles were defined creating three income categories including a small low income group, 11.15% ($0–19,999), a small high income group, 10.3% ($47,000 or more), and a large middle income group, 78.6% ($20,000–46,999) [12].

Surgical procedures were coded following the *Data Acquisition manual* (DAM) [13] and included the following: No cancer-directed surgery: 0–8; surgery unknown: 9; polypectomy, myomectomy, simple excision: 10; subtotal hysterectomy, supracervical hysterectomy, fundectomy, total/pan/simple hysterectomy without removal of tube(s) and ovary(ies) with lymph node dissection: 20–35; total/pan/simple hysterectomy with removal of tube(s) and ovary(ies) without lymph node dissection: 40; modified radical/extended hysterectomy, radical hysterectomy, hysterectomy, not otherwise specified (NOS): 50–60; and pelvic/anterior/posterior/total exenteration, surgery of regional/distant sites/nodes: surgery NOS: 70–90.

Treatment was analyzed by AJCC stage [14,15]. This staging schema is based on tumor size (T), lymph node involvement (N), and distant metastasis (M). The most recent AJCC stage rubric [15] is summarized in Table I. To maximize the number of patients for whom stage was reported, "Combined AJCC Stage Group" was used, which includes the pAJCC stage group where documented, augmented by the cAJCC stage group where pathologic stage is not recorded. Sixteen percent of the 1992 cases and 45.1% of the 1986–1987 cases were reported without clinical or pathologic AJCC stage group. Survival rates were computed for cases diagnosed in 1986–1987.

There is a relationship between AJCC and FIGO staging for cancer of the endometrium, but these data were classified by the AJCC. Exact counts per the FIGO schema are not available.

The aggregate NCDB data are presented below in summary tables. For some tables, cases were omitted which were reported from hospitals who use nonstandard codes, or do not collect the variable under analysis.

Quality

The accuracy of the NCDB data collected has been previously discussed [16]. We have relied on the hospital cancer committee or its equivalent to supervise the quality control of casefinding and abstracting, internal reviews of abstracts by registry staff, hospital-based computer data edits, and the editing checks of regional or state registries to provide adequate accuracy.

In addition, a variety of edit checks were performed. Initially all data were checked for valid codes, then checked for logic between data items. In some cases, hospital-vendor codes that were different from the DAM but could be converted to the standard form are recoded. A case was rejected in total from the NCDB master file if it had an invalid sex, age/date of birth, or primary site code, or if treatment was not reported. For other data items, any incorrect or missing data were coded as unknown and the case report was retained. Record linkage to detect duplicates was performed using sex, three-digit site, birthdate, and zip code. Following this, approximately 5% of the cases were judged duplicate for 1986–1987 and 4% for 1992. These cases were removed from the analytic file for their respective years.

This report summarizes complicated and disparate clinical data as recorded in hundreds of different hospitals across the country. Interpretation should take into account the complex nature of the data classification and coding involved and the circumstances characterizing the data sources.

The reader should remember that the NCDB is not a probabilistic sample of U.S. patients, and the findings cannot be statistically generalized. Further, since the data for 1986/1987 and 1992 are not from identical hospitals, time trend inferences should be drawn on a conditional basis, tempered with clinical plausibility.

Statistical Analysis

A major use of these NCDB data is for comparison at the hospital level, and we would prefer that hospital staff be able to easily replicate our survival calculations. We have selected a survival methodology that is well described in chapter 2 of the AJCC staging manual [14,15], and which can be accomplished without undue mathematical formulation. We calculate the relative, life-table survival (actuarial method) accounting for age mortality differences with 5-year survival probabilities for Whites (1980) as given in that resource document.

In NCDB publications the data are generally presented in stratified form (cross-tabulations) so that possible associations can be directly assessed, without regression techniques. Significance tests (chi-square) are unfortunately a measure of two things: significance and sample size. We consider them misleading used with this type of data for several reasons. First, these are descriptive national survey data and were not collected to evaluate a priori hypotheses, so the problem of multiple significance tests is present. Second, the numbers of cases under analysis are so large that the statistical assumptions of significance

TABLE I. Staging of Cancer of the Corpus Uteri

Primary tumor (T)

TNM	FIGO	Definition
TX	—	Primary tumor cannot be assessed
TO	—	No evidence of primary tumor
Tis	—	Carcinoma in situ
T1	I	Tumor confined to the corpus uteri
T1a	IA	Tumor limited to the endometrium
T1b	IB	Tumor invades up to or less than one half of the myometrium
T1c	IC	Tumor invades more than one half of the myometrium
T2	II	Tumor invades the cervix but not extending beyond the uterus
T2a	IIA	Endocervical glandular involvement only
T2b	IIB	Cervical stromal invasion
T3 and/or N1	III	Local and/or regional spread as specified in T3a, b, N1 FIGO IIIA, B, and C below
T3a	IIIA	Tumor involves the serosa and/or adnexa (direct extension or metastasis) and/or cancer cells in ascites or peritoneal washings
T3b	IIIB	Vaginal involvement (direct extension of metastasis)
N1	IIIC	Metastasis to the pelvic and/or periaortic lymph nodes
T4[a]	IVA	Tumor invades the bladder mucosa or the rectum and/or the bowel mucosa
M1	IVB	Distant metastasis (excluding metastasis to the vagina, pelvic serosa, or adnexa; including metastasis to intra-abdominal lymph nodes, other than periaortic, and/or inguinal lymph nodes)

Regional lymph nodes (N)

NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis

Distant metastasis (M)

TNM	FIGO	Definition
MX	—	Presence of distant metastasis cannot be assessed
M0	—	No distant metastasis
M1	IVB	Distant metastasis

Stage grouping

Stage	T	N	M	FIGO
0	Tis	N0	M0	
IA	T1a	N0	M0	IA
IB	T1b	N0	M0	IB
IC	T1c	N0	M0	IC
IIA	T2a	N0	M0	IIA
IIB	T2b	N0	M0	IIB
IIIA	T3a	N0	M0	IIIA
IIIB	T3b	N0	M0	IIIB
IIIC	T1	N1	M0	IIIC
	T2	N1	M0	
	T3a	N1	M0	
	T3b	N1	M0	
IVA	T4	Any N	M0	IVA
IVB	Any T	Any N	M1	IVB

[a]The presence of bullous edema is not sufficient evidence to classify a tumor as T4

testing are not met. Repeated chi-square testing of these data at the $P < 0.001$ level suggests that markedly more comparisons have significance than the data reasonably support. Third, the cancer population under study represents half of the universe of which they are a subset, further clouding possible interpretation. Thus, we recommend a straightforward, stratified, and conservative assessment of the data patterns presented. Inferences should be based on biologic reasonableness and clinical judgment in the absence of an individual "hypothesis/significance test review."

RESULTS

Two sets of comparisons are included in Table II. First, comparisons are made between the percentages of the 1992 endometrial cancer cases and 1986–1987 endome-

TABLE II. Comparison of the Percentage of 1986–1987 Endometrial Cancers With 1992 Endometrial Cancers, and With All Cancers Reported in 1992, by Diagnosis Year and Selected Patient, Tumor, and Reporting Hospital* Characteristic

	Endometrial cancer		All cancers
	1986–1987	1992	1992
Age			
0–29	0.6	0.5	2.9
30–39	2.8	3.1	4.2
40–49	7.8	9.1	8.3
50–59	19.1	19.0	14.0
60–69	35.4	31.2	28.2
70–79	25.3	27.0	29.4
80+	9.0	10.0	13.1
Total	100.0	100.0	100.0
Total	19,245	17,096	599,597
Median	65.4	65.8	57.3
Region			
Northeast	18.6	21.4	19.0
Southeast	13.5	15.3	17.7
Midwest	29.6	27.7	25.6
South	9.5	13.1	15.7
Mountain	7.1	4.8	5.3
Pacific	21.6	17.7	16.6
Ethnicity			
Non-Hispanic White	88.5	87.4	84.7
Hispanic	1.5	2.5	2.8
Black	4.6	5.7	7.9
American Indian	0.1	0.2	0.1
Asian	1.0	1.2	1.4
Unknown	4.3	3.1	3.0
Income			
<$20,000	9.6	9.7	11.1
20,000–46,999	76.5	74.5	72.9
47,000+	9.2	10.8	10.3
Unknown	4.7	5.0	5.7
Hospital caseload			
<150 Cases	0.9	1.2	1.1
150–499 Cases	17.1	17.9	19.5
500–999 Cases	38.7	38.9	38.5
1,000+ Cases	33.8	33.8	31.4
Unknown size	9.4	8.2	9.5
Approval category			
NCI-recognized center	2.1	2.7	3.4
Teaching hospital	21.6	20.2	19.8
Community-Comprehensive	39.3	33.9	32.4
Community	29.8	27.7	28.5
Other approved	1.4	1.4	0.5
Nonapproved	5.8	14.2	15.4
pAJCC/cAJCC stage			
Stage 0	2.3	2.7	NA
Stage I	39.8	60.9	NA
Stage II	6.0	7.8	NA
Stage III	3.8	7.5	NA
Stage IV	3.0	5.6	NA
Unknown	45.1	15.6	NA

*NA = not applicable.

trial cancer cases by patient, tumor, and reporting hospital covariables of interest. This summarizes differences in endometrial cancer patterns over time. Second, comparisons are made between the percentages of 1992 endometrial cancer cases with all 1992 cancers by these same covariables of interest. This summarizes proportional differences between endometrial cancer and all cancers combined.

Age

The age distribution of reported endometrial cancer cases did not change over time. Endometrial cancer patients were older than all cancer patients combined. In 1992, the median age of the reported endometrial cancer patients was 65.8 years, compared to 57.3 years for all cancer patients, who were 8.5 years younger.

Region

The reported endometrial cancer cases for both 1986–1987 and 1992 were widely distributed over the six U.S. geographic regions. For endometrial cancer, participation of hospitals from the South Region increased between reporting periods. There was little difference between the geographic distribution of endometrial cancer patients from all cancer patients.

Ethnicity and Income

In 1992, somewhat more Hispanic (2.5% vs. 1.5%), Black (5.7% vs. 4.6%), American Indian (0.2% vs. 0.1%), and Asian cases (1.2% vs. 1.0%) were reported than in 1986–1987. This probably reflects changes in the sampling frame. Relatively fewer Blacks were reported with endometrial cancer (5.7%) than for all cancers (7.9%), and slightly fewer Hispanics were reported with endometrial cancer (2.5%) than for all suggesting lower risk to the development of this disease (cross-odds ratio = 0.70).

There was no change in the income distribution of endometrial cancer cases reported between reporting periods. Fewer of the endometrial cancer patients were reported in the low income group than were all cancer patients (cross-odds ratio = 0.86).

Hospital Caseload

There were no marked differences with regard to reporting hospital caseload either between 1986–1987 and 1992 for endometrial cancer, or between endometrial cancers and all cancers.

Approval Category

Most of the cases were reported from hospitals with COC approval status as either teaching hospitals (20.2% in 1992), community-comprehensive cancer centers (33.9% in 1992), and community cancer centers (27.7% in 1992). Relatively few cases were reported from NCI-designated comprehensive and clinical cancer centers (2.7% in 1992), which included 462 endometrial cancer patients. More cases were reported from hospitals without approval status in the 1992 sample (14.2%), than in the 1986–1987 sample (5.8%).

AJCC Stage Grouping

The AJCC is becoming more standardized as a marker of appropriate cancer diagnosis and treatment. Patients reported as unknown stage decreased from 45.1% in 1986–1987 to 15.6% in 1992.

Endometrial Cancer AJCC Stage Grouping

The percentage of patients by combined stage (pAJCC/cAJCC) with unknowns eliminated is compared by time period (diagnosis year), and for 1992 cases by patient, tumor, and hospital characteristics in Table III. The ratio of early stage disease (AJCC stage groups 0 and I) to advanced disease (stages III and IV) is included.

There was no relative improvement over time in the early detection of endometrial cancer, when comparing the 1986–1987 patients with those diagnosed in 1992. It should be remembered that more of the patients were staged in 1992, possibly affecting this finding. How do these staging statistics differ by covariates of interest? A lower ratio of early to advanced disease was reported for both the youngest and the oldest patients. The most favorable stage distributions were reported for those 30–59 years of age.

A remarkable difference in stage distribution was reported by ethnicity and income. The majority subpopulation, non-Hispanic Whites, had 3.2 times as much stage 0 and I disease as stages II, III, and IV. Conversely, lower ratios of early disease were reported for Hispanics (2.6), Asians (2.2), and Blacks (1.5). The percentage of Blacks with stage 0 or I cancer was 60.6% compared to 76.5% for non-Hispanic Whites. The cross-odds ratio of a Black patient with endometrial cancer being diagnosed with an advanced tumor (stage II, III, or IV) compared with non-Hispanic Whites was twofold (2.1). Whether this vast ethnic deficiency was related to differences in early detection, in the biology or aggressiveness of their endometrial cancer, culture or other factors, its effect on the prognosis of these Hispanic and Black patients can be expected to be significant. In the small number of patients identified as American Indian (2.0), there was also evidence of more advanced disease at diagnosis.

Smaller differences in presenting stage than were noted with ethnicity were reported between income groups. Patients in the low income group had 70.8% of stage 0 and I disease compared with 76.8% in the high income group. Although the low income group includes many Hispanics and Blacks, the majority were non-Hispanic Whites. This underscores the probable importance of income in ethnic differentials, and closely ties the prognosis of these patients to the income of their neighborhood.

Patients seen at hospitals with the largest caseloads (1,000+ cases/year) were reported with somewhat less early disease (ratio = 2.9) than those from lower caseload hospitals (ratio = 3.5 at hospitals seeing less than 150 cancers a year). The reasons for this apparent differential are not clear. Lower ratios of patients with early disease were reported from NCI-designated centers (1.8), than at teaching (2.4) and community hospitals (3.2 and 3.4).

TABLE III. Percent of Cases of Endometrial Cancer By Combined Stages (pAJCC/cAJCC) and Selected Patient, Tumor, and Reporting Hospital Characteristic

	Stage group						Ratio of early	
	0	I	II	III	IV	Total	to late disease	Cases[a]
Diagnosis year								
1986–1987	4.1	72.5	10.9	6.9	5.5	100.0	3.3	10,560
1992	3.2	72.1	9.2	8.9	6.6	100.0	3.0	14.429
Total	3.6	72.3	10.0	8.1	6.1	100.0	3.1	24,989
Age[a]								
0–29	12.5	55.4	8.9	1.8	21.4	100.0	2.1	56
30–39	7.5	74.8	8.2	6.8	2.7	100.0	4.6	440
40–49	5.4	74.1	9.0	7.7	3.8	100.0	3.9	1,330
50–59	3.7	75.4	8.1	7.7	5.2	100.0	3.8	2,789
60–69	2.9	73.6	8.3	8.7	6.5	100.0	3.3	4,522
70–79	2.4	70.4	9.9	9.3	8.0	100.0	2.7	3,926
80+	1.3	63.2	13.4	13.0	9.2	100.0	1.8	1,366
Total	3.2	72.1	9.2	8.9	6.6	100.0	3.0	14,429
Ethnicity[a]								
Non-Hispanic White	3.1	73.4	9.0	8.5	6.1	100.0	3.2	12,625
Hispanic	4.9	67.7	11.1	9.4	7.0	100.0	2.6	371
Black	3.0	57.6	11.7	14.0	13.7	100.0	1.5	798
American Indian	8.3	58.3	12.5	12.5	8.3	100.0	2.0	24
Asian	1.7	66.7	10.2	11.9	9.6	100.0	2.2	177
Unknown	5.5	68.2	11.1	8.1	7.1	100.0	2.8	434
Income								
<$20,000	2.4	68.4	11.3	9.7	8.2	100.0	2.4	1,440
20,000–46,999	3.1	72.5	9.2	8.7	6.5	100.0	3.1	10,638
47,000+	2.9	73.4	8.3	9.2	6.2	100.0	3.2	1,600
Unknown	6.1	70.7	8.0	8.7	6.5	100.0	3.3	751
Hospital caseload[a]								
<150 Cases	3.3	74.5	8.5	7.8	5.9	100.0	3.5	153
150–499 Cases	3.9	73.2	8.7	8.3	5.9	100.0	3.4	2,552
500–999 Cases	3.5	71.6	9.6	8.8	6.6	100.0	3.0	5,691
1,000+ Cases	2.6	71.8	9.2	9.1	7.4	100.0	2.9	4,783
Unknown size	2.4	73.2	9.2	9.6	5.6	100.0	3.1	1,250
Type of hospital (approval category)[a]								
NCI-recognized center	0.9	63.2	10.2	15.9	9.9	100.0	1.8	334
Teaching hospital	2.2	68.6	10.0	10.8	8.4	100.0	2.4	2,907
Community-Comprehensive	3.6	72.4	9.3	8.6	6.1	100.0	3.2	4,982
Community	3.7	73.5	8.6	8.3	5.8	100.0	3.4	3,980
Other approved	0.0	72.8	10.2	9.4	7.7	100.0	2.7	235
Nonapproved	3.3	75.0	8.8	6.7	6.2	100.0	3.6	1,991
Grade[a]								
Grade 1	3.8	86.1	6.2	2.8	1.1	100.0	8.9	5,430
Grade 2	0.9	76.1	11.2	8.1	3.6	100.0	3.3	4,829
Grade 3	0.7	51.0	12.2	19.1	17.1	100.0	1.1	2,575
Grade 4	0.0	37.2	10.9	24.8	27.1	100.0	0.6	258
Unknown	14.4	48.3	8.5	13.3	15.5	100.0	1.7	1,337
Total	3.2	72.1	9.2	8.9	6.6	100.0	3.0	14,429

[a]Ratio = Stage groups 0 + I / stage groups II + III + IV.

This may reflect referral patterns of more difficult cases to these research and teaching centers or ethnic/income differences in the patient populations.

A strong correlation between AJCC stage group and histologic grade was reported. For grade 1 tumors, 89.9% were stage 0 or I, compared with 37.2% for grade 4 (undifferentiated). The reason for this correlation between stage and tumor grade is probably related to the greater likelihood of metastatic disease related to increasing grade.

Surgery

Table IV reflects several trends that have occurred between 1987 and 1992. Fewer patients were apparently deemed unacceptable for surgery (14.8% in 1987 vs. 9.8% in 1992).

TABLE IV. Percent of Cases of Endometrial Cancer by Surgery and Selected Patient, Tumor, and Reporting Hospital Characteristic

	No cancer-directed surgery	Simple excision	Subtotal hysterectomy without removal ovaries/tubes	Total hysterectomy with removal ovaries/tubes	Modified radical hysterectomy	Other/ unknown	Total	Cases
Diagnosis year								
1986–1987	14.8	1.2	4.0	52.5	20.1	7.4	100.0	19,236
1992	9.8	1.4	5.3	48.6	32.7	2.2	100.0	17,089
Total	12.4	1.3	4.6	50.6	26.0	5.0	100.0	36,325
Stage[a]								
Stage 0	5.0	2.6	12.9	59.8	17.7	2.0	100.0	458
Stage I	5.6	1.2	5.7	54.3	31.9	1.3	100.0	10,399
Stage II	11.9	1.7	4.1	43.0	37.6	1.8	100.0	1,332
Stage III	11.8	0.8	3.4	32.1	49.7	2.2	100.0	1,279
Stage IV	27.3	2.1	4.0	29.0	29.5	8.0	100.0	955
Unknown	18.9	2.1	4.2	42.3	28.6	3.9	100.0	2,666
Total	9.8	1.4	5.3	48.6	32.7	2.2	100.0	17,089
Grade[a]								
Grade 1	6.5	1.2	6.7	58.8	25.4	1.4	100.0	6,292
Grade 2	8.6	1.3	3.9	47.3	37.1	1.7	100.0	5,620
Grade 3	13.1	1.7	3.8	36.0	42.0	3.4	100.0	3,090
Grade 4	14.2	1.2	5.1	34.9	40.1	4.5	100.0	332
Unknown	18.9	2.5	7.2	40.9	26.7	3.7	100.0	1,755
Age[a]								
0–29	34.1	1.2	15.3	27.1	14.1	8.2	100.0	85
30–39	7.2	4.1	13.0	40.9	31.6	3.2	100.0	531
40–49	6.1	1.3	7.7	50.6	32.4	1.9	100.0	1,559
50–59	6.9	1.2	3.8	51.2	35.0	1.8	100.0	3,244
60–69	8.5	1.1	4.6	49.3	34.4	2.0	100.0	5,337
70–79	10.4	1.4	5.1	48.1	32.7	2.3	100.0	4,621
80+	21.0	2.5	5.5	44.2	24.1	2.9	100.0	1,712
Region[a]								
Northeast	12.3	2.0	4.8	47.2	32.0	1.8	100.0	3,666
Southeast	11.5	2.0	6.4	46.8	31.0	2.3	100.0	2,619
Midwest	9.1	1.5	4.8	48.5	32.3	3.8	100.0	4,730
South	10.1	1.1	5.9	43.9	37.6	1.3	100.0	2,237
Mountain	7.4	1.0	5.0	56.0	30.0	0.6	100.0	823
Pacific	6.9	0.6	5.2	53.5	32.7	1.2	100.0	3,014
Ethnicity[a]								
Non-Hispanic White	9.1	1.5	5.3	50.1	32.3	1.7	100.0	14,948
Hispanic	10.5	1.4	5.7	45.0	35.0	2.3	100.0	420
Black	20.5	1.4	5.4	37.3	33.2	2.2	100.0	969
American Indian	15.4	0.0	7.7	34.6	38.5	3.8	100.0	26
Asian	6.3	0.0	3.4	43.7	44.7	1.9	100.0	206
Unknown	10.4	0.6	4.2	31.7	36.3	16.7	100.0	520
Income[a]								
<$20,000	12.8	1.4	5.9	47.1	30.9	1.9	100.0	1,654
20,000–46,999	9.8	1.4	5.3	49.0	32.3	2.2	100.0	12,736
47,000+	8.3	1.6	4.6	46.3	36.7	2.5	100.0	1,837
Unknown	8.5	1.5	5.1	49.7	32.8	2.4	100.0	862
Hospital caseload[a]								
<150 Cases	11.4	1.5	7.9	60.4	18.8	0.0	100.0	202
150–499 Cases	11.1	1.8	5.1	54.0	25.7	2.3	100.0	3,062
500–999 Cases	10.4	1.5	5.5	50.1	30.6	1.9	100.0	6,645
1,000+ Cases	8.5	1.0	5.0	44.1	38.9	2.5	100.0	5,783
Unknown size	9.8	2.1	5.4	46.6	34.0	2.1	100.0	1,397
Approval category[a]								
NCI-recognized center	7.0	0.7	4.4	38.6	47.8	1.5	100.0	458
Teaching hospital	8.3	1.4	4.4	41.1	41.7	3.0	100.0	3,445
Community-comprehensive	10.0	1.1	5.4	49.3	31.8	2.2	100.0	5,790
Community	11.0	1.8	5.5	53.4	27.0	1.4	100.0	4,734
Other approved	7.0	0.4	2.5	24.6	63.1	2.5	100.0	244
Nonapproved	10.0	1.9	6.0	52.4	27.0	2.6	100.0	2,418

[a] 1992.

TABLE V. Percent of Cases of Endometrial Cancer by Treatment Combination and Selected Patient, Tumor, and Reporting Hospital Characteristic

	Surgery	Surgery and radiation	Radiation	Surgery and chemotherapy	Surgery, radiation, and chemotherapy	Other	None	Total	Cases
Diagnosis year									
1986–1987	42.6	29.8	9.8	3.1	2.3	2.8	9.6	100.0	19,245
1992	53.8	27.7	4.7	4.0	2.4	2.1	5.3	100.0	17,095
Total	47.9	28.8	7.4	3.5	2.3	2.5	7.6	100.0	36,340
Stage[a]									
Stage 0	88.6	3.1	0.4	1.1	0.2	0.2	6.3	100.0	458
Stage I	64.6	25.9	3.5	1.7	0.9	0.5	2.9	100.0	10,402
Stage II	27.4	54.5	8.9	2.4	2.1	1.1	3.7	100.0	1,333
Stage III	19.0	44.8	8.0	12.0	10.1	3.0	3.2	100.0	1,281
Stage IV	18.2	13.0	7.3	23.7	9.7	17.3	10.8	100.0	955
Unknown	48.3	22.6	5.5	3.8	2.4	3.2	14.1	100.0	2,666
Total	53.8	27.7	4.7	4.0	2.4	2.1	5.3	100.0	17,095
Grade[a]									
Grade 1	72.6	16.8	2.8	1.7	0.9	0.7	4.5	100.0	6,292
Grade 2	49.3	35.5	5.0	2.8	1.9	1.3	4.1	100.0	5,625
Grade 3	29.6	40.8	7.2	7.6	5.6	3.9	5.5	100.0	3,090
Grade 4	29.7	32.1	5.1	11.4	7.8	5.7	8.1	100.0	333
Unknown	48.0	17.8	6.2	8.8	2.8	5.5	11.0	100.0	1,755
Age[a]									
0–29	42.4	4.7	1.2	8.2	2.4	15.3	25.9	100.0	85
30–39	64.4	17.1	3.2	5.6	2.4	1.1	6.0	100.0	531
40–49	65.6	19.2	2.2	3.8	3.3	1.2	4.6	100.0	1,559
50–59	58.9	25.8	3.6	4.0	2.5	1.6	3.6	100.0	3,245
60–69	52.2	30.3	4.2	4.3	2.6	2.0	4.4	100.0	5,338
70–79	48.8	32.8	5.5	3.6	2.2	2.3	4.9	100.0	4,622
80+	49.2	21.8	9.3	3.8	1.2	3.0	11.7	100.0	1,715
Region[a]									
Northeast	48.3	31.0	5.3	4.1	2.5	2.1	6.7	100.0	3,666
Southeast	55.4	24.0	5.3	4.4	2.4	2.6	5.8	100.0	2,619
Midwest	50.1	30.9	5.3	3.7	2.2	2.3	5.5	100.0	4,736
South	56.3	25.3	5.3	4.6	2.3	2.0	4.1	100.0	2,237
Mountain	61.8	25.3	3.0	2.8	2.1	0.9	4.1	100.0	823
Pacific	60.9	24.2	2.5	4.1	2.6	1.6	4.0	100.0	3,014
Ethnicity[a]									
Non-Hispanic White	54.5	28.4	4.3	3.9	2.4	1.9	4.6	100.0	14,948
Hispanic	51.4	28.3	6.0	5.2	2.1	1.4	5.5	100.0	420
Black	44.9	22.9	7.9	6.4	3.1	4.1	10.6	100.0	969
American Indian	53.8	26.9	11.5	0.0	0.0	3.8	3.8	100.0	26
Asian	57.3	25.2	1.9	7.3	1.9	0.5	5.8	100.0	206
Unknown	50.4	17.5	8.9	3.0	1.1	3.8	15.2	100.0	526
Income[a]									
<$20,000	51.2	28.2	6.6	4.4	1.5	2.6	5.6	100.0	1,655
20,000–46,999	53.9	27.9	4.7	4.0	2.3	2.0	5.3	100.0	12,741
47,000+	56.7	25.7	3.6	4.0	2.8	1.9	5.2	100.0	1,837
Unknown	52.0	28.5	3.8	4.4	4.2	1.9	5.2	100.0	862
Hospital caseload[a]									
<150 Cases	63.9	22.4	3.9	1.0	0.0	1.5	7.3	100.0	205
150–499 Cases	56.2	24.8	4.2	3.4	2.2	1.8	7.5	100.0	3,064
500–999 Cases	54.1	27.6	5.2	3.8	2.2	2.1	5.0	100.0	6,645
1,000+ Cases	52.2	29.1	4.5	4.8	2.8	2.3	4.3	100.0	5,783
Unknown size	52.4	29.3	4.5	3.9	2.4	1.6	5.9	100.0	1,398
Total	53.8	27.7	4.7	4.0	2.4	2.1	5.3	100.0	17,095
Approval category[a]									
NCI-recognized Cent	48.9	32.5	1.7	6.6	3.5	2.8	3.9	100.0	458
Teaching hospital	52.9	27.5	4.8	5.3	2.8	2.5	4.0	100.0	3,445
Community-comprehen	53.8	27.9	5.2	3.8	2.2	2.0	5.0	100.0	5,790
Community	54.0	28.1	4.7	3.4	2.2	1.8	5.8	100.0	4,734
Other approved	46.7	35.2	4.1	6.1	2.5	2.0	3.3	100.0	244
Nonapproved	56.6	24.9	4.0	3.4	2.3	1.8	7.0	100.0	2,424

[a] 1992.

TABLE VI. Endometrial Cancer Relative Survival (%) by Patient and Tumor Characteristics, 1986–1987

	Years of survival						
	0	1	2	3	4	5	Cases
Age							
0–59	100	95	92	89	87	85	5,944
60–69	100	92	86	82	78	76	6,961
70–79	100	88	79	74	69	65	4,938
80+	100	81	66	57	51	46	1,733
Ethnicity							
Non-Hispanic White	100	92	85	81	77	74	13,972
Hispanic	100	92	83	81	79	76	778
Black	100	79	65	57	63	50	782
Income							
Low	100	88	79	73	68	65	1,923
Medium	100	91	84	80	77	74	14,978
High	100	93	86	83	79	76	2,441
Grade							
Grade 1	100	97	94	92	90	87	6,519
Grade 2	100	93	87	82	79	75	6,563
Grade 3	100	83	71	65	60	57	5,488
Grade 4	100	75	62	57	54	52	443

The modified radical hysterectomy group represents, for the most part, patients who receive extended hysterectomy and pelvic and/or para-aortic nodal dissection or biopsy as part of their therapy. There was a 12.6% increase in the percentage of women undergoing this procedure.

As expected, fewer patients with stage 0 carcinoma underwent nodal evaluation as part of their surgical procedure. More patients who were stage III received surgery that included nodal dissection. This high percentage (49.7%) probably reflects the upstaging that occurs in this group of patients as a result of nodes being positive. Fewer patients in the 80+ and 0–29 age groups received nodal dissection than in other groups. Patients treated in the South region were somewhat more likely to undergo nodal dissection than those in other areas of the country.

Blacks were more likely to have no cancer-directed surgery, probably reflecting the greater likelihood of their having advanced stage disease. Of note, however, is that Blacks were as likely as other ethnic groups to have nodal dissections when surgery did become part of their therapy. The percentage of patients receiving nodal dissection increases with hospital caseload and category of approval, with NCI recognized centers performing nodal dissections in 47.8% of cases.

Multimodality Treatment for Endometrial Cancer

There is a time trend increase in the percentage of patients receiving surgery only. In 1992, 53.8% of patients received surgery only compared to 42.6% in 1987 (Table V). There is a parallel decrease in the percent of patients treated with radiation in 1986–1987 (41.9%) compared with 1992 (34.8%). Patients seen at hospitals with higher annual caseloads were more likely to receive combined surgery and radiation (29.1%) than smaller hospitals with caseloads of 150–499 cases (24.8%), or less than 150 cases per year (22.4%).

Relatively minimal differences in multimodality treatments were noted by region. Blacks were more likely to receive multimodality therapy or no therapy, probably reflecting the higher stage at which they presented. There did not appear to be great differences in treatment based on income, hospital caseload, or approval category.

Survival After Treatment

Survival was negatively influenced by advancing age, ethnicity (Blacks had poorer survival), low income, and increasing grade of tumor (Table VI). Survival did not appear to be greatly influenced by the type of surgery, however, patients were not randomized and are, therefore, not comparable with regard to all prognostic factors.

In stage I disease, survival decreased with the combination of radiation or systemic therapy with surgery and was poorest in patients receiving radiation only (Table VII). In stage III disease, the most favorable survival was reported in patients receiving combination surgery and radiation, and those with the poorest survival received combination surgery and chemotherapy. This, however, could possibly reflect a difference in other prognostic variables between these groups.

Ultimate 5-year survival does correlate with AJCC stage of disease (Fig. 1).

DISCUSSION

In interpreting these findings, the limitations of the data set should be remembered. Because of the nature and manner in which the data were collected (voluntary

TABLE VII. Endometrial Cancer Relative Survival (%) by Stage and Surgical Procedure, 1986–1987

Characteristic	Stage	Years of survival 0	1	2	3	4	5	Cases[b]
Surgery[a]								
Subtotal hysterectomy	I	100	96	94	92	89	84	248
Total hysterectomy	I	100	98	94	91	88	85	3,761
Modified radical hysterectomy	I	100	96	91	87	84	80	1,233
Subtotal hysterectomy	II	100	100	86	76	76	72	28
Total hysterectomy	II	100	95	86	80	74	69	448
Modified radical hysterectomy	II	100	91	80	71	68	63	209
Subtotal hysterectomy	III	—	—	—	—	—	—	12
Total hysterectomy	III	100	80	64	57	50	48	270
Modified radical hysterectomy	III	100	80	65	58	54	51	167
Subtotal hysterectomy	IV	—	—	—	—	—	—	7
Total hysterectomy	IV	100	53	34	29	24	22	153
Modified radical hysterectomy	IV	100	59	43	34	28	28	83
Multimodality treatment[a]								
Surgery	0	100	97	96	94	92	90	271
Surgery with radiation	0	100	100	82	79	74	74	28
Surgery with chemotherapy	0	—	—	—	—	—	—	5
Radiation	0	—	—	—	—	—	—	1
Surgery	I	100	97	94	92	89	87	3,141
Surgery with radiation	I	100	97	92	88	85	81	2,086
Surgery with chemotherapy	I	100	97	76	67	64	61	33
Radiation	I	100	83	71	59	50	47	34
Surgery	II	100	89	79	70	66	58	145
Surgery with radiation	II	100	95	85	79	73	69	549
Surgery with chemotherapy	II	—	—	—	—	—	—	12
Radiation	II	—	—	—	—	—	—	7
Surgery	III	100	74	56	51	47	46	116
Surgery with radiation	III	100	84	69	62	56	52	123
Surgery with chemotherapy	III	100	71	46	38	31	31	27
Radiation	III	100	75	59	41	41	37	32
Surgery	IV	100	39	27	26	22	20	88
Surgery with radiation	IV	100	68	52	40	34	33	80
Surgery with chemotherapy	IV	100	55	29	21	16	16	63
Radiation	IV	100	58	25	20	15	15	21

[a]Survival data on surgery/treatment are presented only to provide a record of outcome experience when such treatments are used. Patients were not randomized into surgery/treatment groups nor were they comparable with regard to all prognostic factors. No comparison between surgery/treatment groups is intended or appropriate.
[b]Unstaged cases have been omitted.

participation), hospital and patient selection bias are possible. Thse data represent a large series of cases, but are not a probabilistic sample of the United States. Some of the analysis is performed on staged patients only. The possibility exists that systematic differences may exist between staged and unstaged patients. The number of patients staged differed between the two study periods, introducing the possibility of bias relating to this difference.

There were no striking differences among age distribution, ethnicity, income level, hospital caseload, or approval category in the time trends between 1986–1987 and 1992 in this report. There was, however, a significant decrease in the unknown stage category, suggesting a continual increase in the efforts of the cancer registrars and the treating physicians to properly stage patients with this disease. This trend has been seen with other cancers in the NCDB.

No improvement over time occurred in the early detection of endometrial cancer, which may reflect the fact that routine screening is not generally accepted for this disease. It is of interest to note, however, that in the PCE study done by the COC in 1981, 81% of patients were clinically stage I [16]. The decrease to 72% seen in this reporting period probably reflects the upstaging that occurs as a result of the current surgicopathologic staging of this disease and would suggest that at least 10% of patients are upstaged by surgical and pathologic finding versus clinical findings only.

Although Blacks make up only a relatively small percentage of women with endometrial cancer, it is of great concern that the ratio of early to late stage disease is

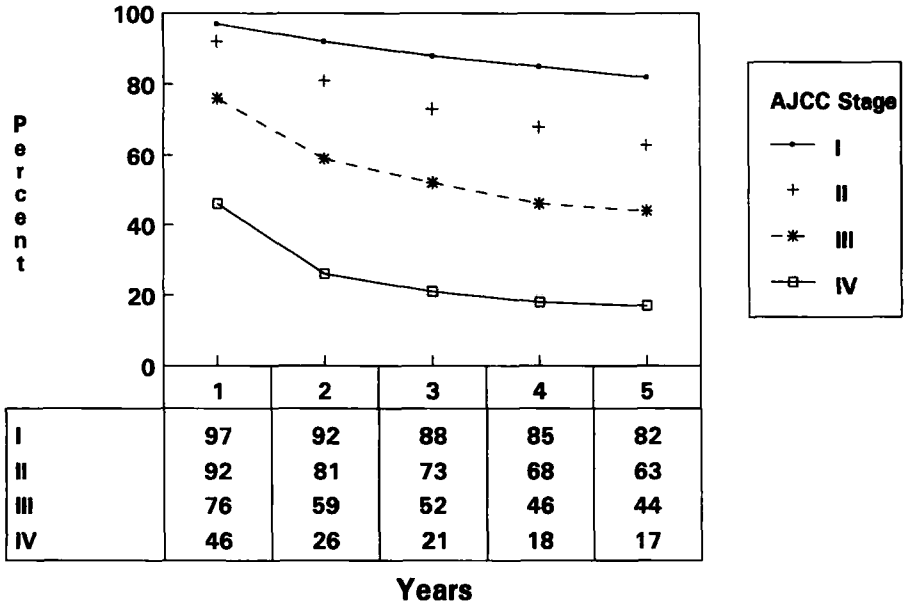

Fig. 1. Relative 5-year endometrial cancer survival by stage group (pAJCC/cAJCC), 1986–1987.

considerably lower in this ethnic group (ratio 1.5 compared to 3.2 for non-Hispanic Whites). Smaller differences were reported among income groups but patients in the low income group had fewer cases in the stage 0 and stage I groups. A majority of the low income group are non-Hispanic Whites, indicating that income rather than race may explain much of the ethnic differences in stage.

The fact that the most favorable stage distributions were reported for those 30–59 years of age may reflect different screening recommendations or practices, and/or different patterns of gynecologic care for these childbearing age subpopulations. It is also theoretically possible that these differences may reflect age differences in tumor biology.

Surgical trends of significance include a 12.6% (from 20.1 to 32.7%) increase in the percentage of women undergoing modified radical hysterectomy, including node dissections. It is of interest to note that only 5% of women in the 1981 PCE study on endometrial cancer received nodal dissections [17]. This procedure has thus increased from only 5% of cases in 1981 to 32.7% of cases in 1992. Patients undergoing surgery for endometrial carcinoma are more likely to have nodal dissections performed if the procedure is reported from an NCI-recognized or teaching hospital.

Time trends indicate that a larger percentage of patients are undergoing treatment with surgery only, and are being surgically staged. This appears to have had the effect of fewer patients receiving preoperative radiotherapy. This trend is likely because of the lack of convincing evidence that radiation is beneficial in patients who are shown surgicopathologically to have disease confined to the fundus, i.e., stage I. The likelihood of receiving radiation therapy also appears to increase with age.

As expected and seen with other cancers, advancing age, ethnicity, low income, and increasing grade of tumor all have a negative influence on survival. Blacks are more likely to receive multimodality therapy, reflecting their advanced stage at presentation. The 25% decrease in 5-year survival among Blacks compared to non-Hispanic Whites and Hispanics is particularly troublesome and needs further study.

Since this was not a randomized trial comparing different treatment modalities, it is difficult to draw conclusions regarding the efficacy of different surgical approaches and multimodality treatments. It is, however, clear that the current AJCC staging system accurately reflects differences in prognosis by stage of disease.

These data suggest that traditional hospital cancer registry statistics can be used to describe and assess endometrial cancer patient care for hospital cohorts of patients. The more important findings described in this assessment include: 1) The decreased ratio of early to late stage disease seen among Blacks, 2) the trend over time for an increase in nodal assessment as part of management, and 3) the trend over time for decreased utilization radiation as part of the management of this disease.

REFERENCES

1. American Cancer Society: "Cancer Facts and Figures—1994." Atlanta: American Cancer Society, 1994.
2. Morrow CP, Bundy BN, Kurman RJ, et al.: Relationship between surgical/pathological risk factors in outcome in clinical stage I and II carcinoma of the endometrium, a gynecologic group study. Gynecol Oncol 40:55–65, 1991.
3. Steele GD Jr, Winchester DP, Menck HR, Murphy GP: "National

Cancer Data Base Annual Review of Patient Care—1992." Atlanta: American Cancer Society, 1992.
4. Steele GD Jr, Winchester DP, Menck HR, Murphy GP: "National Cancer Data Base Annual Review of Patient Care—1993." Atlanta: American Cancer Society, 1993.
5. Steele GD, Menck HR: Introduction. In Steele GD, Winchester DP, Osteen RT, et al. (eds): "National Cancer Data Base: Annual Review of Patient Care, 1994." Atlanta: American Cancer Society, 1994, 1–15.
6. Young JL, Percy CL, Asire AJ: Surveillance, epidemiology, and end results: Incidence and mortality data, 1973–1977. Natl Cancer Inst Monogr 57, NIH Pub. No. 81-2330, 1981.
7. Gordon B, Derrick L, Van Holten V: "Summary of Exchange Record Fields and Coding Standards, AACCR National Standard for Cancer Data Exchange, Version 1.0, September 29, 1991." Emeryville, CA: American Association of Central Cancer Registries, 1991.
8. Commission on Cancer: "Cancer Program Manual." Chicago: American College of Surgeons, 1991.
9. Commission on Cancer: "Data Acquisition Manual." Chicago: American College of Surgeons, 1990.
10. World Health Organization: "International Classification of Diseases for Oncology, 1st ed." Geneva: World Health Organization, 1976.
11. World Health Organization: "International Classification of Diseases for Oncology, 2nd ed." Geneva: World health Organization, 1992.
12. CACI Marketing Systems: "1990 Sourcebook of ZIP Code Demographics, Tape and File Documentation." Arlington, VA: CACI, Inc., 1992.
13. Commission on Cancer: "Data Acquisition Manual." Chicago: American College of Surgeons, 1990.
14. Beahrs OH, Henson DE, Hutter RVP, Kennedy BJ (eds): "Manual for Staging of Cancer, 3rd ed." Philadelphia: Lippincott, 1988.
15. Beahrs OH, Henson DE, Hutter RVP, Kennedy BJ (eds): "Manual for Staging of Cancer, 4th ed." Philadelphia: Lippincott, 1992.
16. Smart CR, Karnell LH, Eberle C, et al.: Quality control. In Steele GD, Winchester DP, Osteen RT, et al. (eds). "National Cancer Data Base: Annual Review of Patient Care, 1994." Atlanta: American Cancer Society, 1994.
17. Wharton JT, Mikuta JJ, Mettlin C, et al: Risk factors and current management in endometrial carcinoma: A survey by the American College of Surgeons. Surg Gynecol Obstet 162:515–520, 1986.